Physics department

College of Education

Salahaddin University-Erbil

Subject: Numerical Methode

Course Book – (High Diploma)

Lecturer's name: Dr. Mohammad Mustafa Dzayi

Academic Year: 2023/2024

Course Book

1. Course name	Numerical Method
2. Lecturer in charge	Dr. **Mohammad Mustafa Dzayi**
3. Department/ College	**Physics, Education**
4. Contact	e-mails: muhamad.othman@su.edu.krd
5. Time (in hours) per week	Theory**:** **3 Hours**
6. Office hours	**Monday:** 8:30 AM To 11:30 AM
7. Course code	

Contents of Course Book

CHAPTER 1—Errors
1.1 Introduction
1.2 Significant digits
1.3 Rounding off numbers
1.4 Errors
1.5 Relative error and the number of correct digits
1.6 General error formula
1.7 Application of errors to the fundamental
operations of arithmetic
Exercise

CHAPTER 2—Curve Fitting
2.1 Introduction
2.2 The straight line
2.3 Fitting a straight line
2.4 Fitting a parabola
2.5 Exponential function y = aebx
Exercise
CHAPTER 3—Solution of Algebraic and Transcendental Equations
3.1 Bisection methode
3.2 The iteration method
3.3 Newton–Raphson method or Newton iteration method
3.4 Generalized Newton's method for multiple roots
Exercise

CHAPTER 4—Solution of Linear Equations
4.1 Matrix inversion method
4.2 Gauss–Elimination method
4.3 Iteration methods
4.3.1 Gauss seidel method
4.3.2 Jacobi methode
Exercise

CHAPTER 6—Interpolation with Equal Intervals and Unequal Intervals
6.1 Newton's forward interpolation formula
6.2 Newton–Gregory backward interpolation formula
6.3 Error in the interpolation formula
6.4 Newton's general divided differences formula
6.5 Lagrange's interpolation formula
Exercise

CHAPTER 7—Numerical Differentiation
7.1 Derivatives using Newton's forward interpolation formula
7.2 Derivatives using Newton's backward interpolation formula
7.3 Derivatives using Stirling's formula
Exercise

CHAPTER 8—Numerical Integration and Ordinary Differential Equations
8.1 Trapezoidal rule
8.2 Simpson's one-third rule
8.3 Simpson's three-eighths rule
8.4 Taylor's series method
8.5 Runge-Kutta method
8.6 Modified Euler's method
Exercise